



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,234	08/31/2001	Tuyen V. Nguyen	09799940-0101	1791

26263 7590 07/28/2003

SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

LEE, HSIEN MING

ART UNIT PAPER NUMBER

2823

DATE MAILED: 07/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/944,234

Applicant(s)

ZAGREBELNY ET AL.

Examiner

Hsien-Ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 12-16 and 24-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 12-16 and 24-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Remarks

1. Applicant's cancellation to claims 9-11 and 17-23 is acknowledged. Claims 1-8, 12-16 and 24-26 are pending in the application.
2. The 112-second-paragraph rejection to claims 3, 4, 6-10 and 24-26 are withdrawn.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-5, 13-16 and 24-26 rejected under 35 U.S.C. 102(e) as being anticipated by Kim et al. (US 6,484,300).

In re claims 1-5, Kim et al. expressly and inherently teach the claimed method of making a semiconductor structure, comprising:

- measuring a thickness and pattern density of a layer 530 to be polished, measuring the thickness being X1 (Fig. 5A and col. 10, lines 3-63);
- identifying a composition of the layer, i.e. identifying the composition being silicon oxide (col. 12, lines 29-34);
- calculating a first polish time sufficient to planarize a layer 530 on a semiconductor substrate 510, i.e. calculating a first polish time enough to polish the layer 530 from thickness X1 down to a predetermined thickness by computer simulation, prior to reaching thickness X2 (Fig. 5A) (abstract, col. 10, line 64 through col. 11, line 11);

- determining a second polish time sufficient to reduce the thickness of the layer 530 after planarization to the predetermined thickness and polishing the layer 530 for the second polish time, i.e. determining a time enough to polish the layer 530 from the predetermined thickness down to thickness X2 based on computer simulation and polishing the layer 530 for the second time to reach the thickness X2 (Fig. 5A and col. 16, claim 10);
- polishing the layer 530 for said first polish time to planarize the layer 530 from a thickness X1 as shown in Fig. 5A; and
- polishing the layer 530 to a predetermined thickness (i.e. down to thickness X2 as shown in Fig. 5A).

In re claims 13-16, Kim et al. also teach making a semiconductor structure as shown in Fig. 5A by the method and forming a semiconductor device and an electronic device comprising the semiconductor device (i.e. integrated circuit device) from the structure (col. 14, lines 49-56).

In re claims 24-26, Kim et al. further teach the claimed method, comprising: polishing a layer 530 on a semiconductor substrate 510 with a system comprising a chemical mechanical polishing apparatus and machine readable medium, comprising code, imbedded in the machine readable medium, for calculating a first polish time, sufficient to planarize a layer 530 on a substrate 510 (Figs. 3A-3C and col. 19, claim 29) and forming an electronic device comprising a semiconductor device, as stated above..

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2823

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6-8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US '300) in view of Maekawa (US 6,351,723).

In re claims 6 and 7, Kim et al. substantially teach the claimed method as stated above but fail to teach that a Cpk of the method is at least 1.

However, Maekawa teaches that the Cpk value (a value of a deviation process capability) has been monitored in CMP process, wherein the Cpk value needs to be controlled at least 1 to obtain a sufficient process capability (col.6, lines 47-67).

Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to diagnose and control the Cpk value at least 1, as taught by Maekawa, during the CMP of Kim et al. for the purpose of preventing the process from failure (see abstract, Maekawa).

In re claim 8, Kim et al. in view of Maekawa teach the making of each semiconductor structure comprise, prior to calculating of the first polish time, measuring the thickness of the layer 530, a pattern density of the layer 530 and identifying a composition of the layer 530, as stated above.

In re claim 12, Kim et al. teach the claimed method of making a semiconductor structure, including the calculating step as stated above, but do not expressly teach polishing for a third polish time equal to the sum of the first and second polish times.

However, the selection of the third polish time is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of

Art Unit: 2823

species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). For example, the third polish time depends on the desired final thickness of the layer, pattern density and composition of the layer. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

Art Unit: 2823

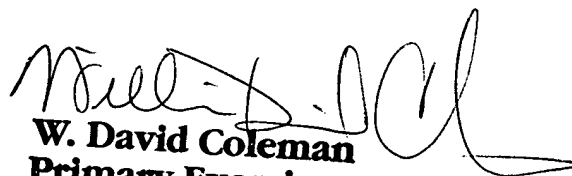
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Hsien-Ming Lee
Examiner
Art Unit 2823



July 22, 2003



W. David Coleman
Primary Examiner